CERTIFICATE OF MAILING BY "FIRST CLASS MAIL" 37 C.F.R. §1.10

I hereby certify that paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" Services under 37 CFR 1.10 on, <u>December 21, 2000</u>, under Express Mail Label No. <u>EL 43839</u>1046 US and is addressed to:

Box: Patent Application, Assistant Commissioner for Patents, Washington, D.C. 20231.

Cronder

Patti Crowder

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the application of:

Benjamin N. Eldridge et al.

Application No.: 09/452,255

Filing Date: May 26, 1995

For: ELECTRICAL CONTACT STRUCTURES

FORMED BY CONFIGURING A FLEXIBLE WIRE TO HAVE A SPRINGABLE SHAPE AND OVERCOATING THE WIRE WITH AT LEAST ONE LAYER OF A RESILIENT CONDUCTIVE MATERIAL, METHODS OF MOUNTING THE CONTACT STRUCTURES TO ELECTRONIC COMPONENTS, AND APPLICATIONS FOR EMPLOYING THE

CONTACT STRUCTURES

Examiner: C. Arbes

Group Art Unit: 3729

COMMUNICATION

Box: Patent Application

Assistant Commissioner for Patents

Washington, D.C. 20231

Dear Sir:

Please note that the inventors residence addresses have changed as follows:

- Benjamin N. Eldridge
 651 Sheri Lane
 Danville, California 94526
- Gary W. Grube
 6807 Singletree Court
 Pleasanton, California 94588

Igor Y. Khandros
 Haciendas Road
 Orinda, California 94563

4. Gaetan L. Mathieu 659 Orange Way Livermore, California 94550

Entry of the above-information is hereby respectfully requested.

Respectfully submitted,

Date: December 21, 2000

/: __

Stuart L. Merkadeau Registration No. 33,262

FormFactor, Inc. Legal Department 5666 La Ribera St. Livermore, CA 94550 925-294-4300 925-294-8147 Fax

11/3/95

01/452255

PATENT APPLICATION SERIAL NO.

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE FEE RECORD SHEET

ELECTRICAL CONTACT STRUCTURES FORMED BY CONFIGURING A FLEXIBLE WIRE TO HAVE A SPRINGABLE SHAPE AND OVERCOATING THE WIRE WITH AT LEAST ONE LAYER OF A RESILIENT CONDUCTIVE MATERIAL, METHODS OF MOUNTING THE CONTACT STRUCTURES TO ELECTRONIC COMPONENTS, AND APPLICATIONS FOR EMPLOYING THE CONTACT STRUCTURES

OUTLINE

TOPIC HEADING	pg.#
TECHNICAL FIELD OF THE INVENTION	1
CROSS-REFERENCE TO RELATED APPLICATIONS	2
BACKGROUND OF THE INVENTION	4
DISCLOSURE (SUMMARY) OF THE INVENTION	23
BRIEF DESCRIPTION OF THE DRAWINGS	29
DETAILED DESCRIPTION OF THE INVENTION	47 47 53
BONDING A WIRE TO AN AREA ON A SUBSTRATE	57
PROPERTIES OF THE WIRE	61
FORMING AND SHAPING OF THE WIRE STEM	64
TYPES OF WIREBONDERS	82
ULTRASONIC FORMING	84
COMPENSATING FOR SPRINGBACK OF THE WIRE	87
SEVERING THE WIRE Figures 4A-4D	91
COATING THE WIRE STEM Figures 5, 5A-5I	98
COATING TECHNIQUES, MATERIALS AND THICKNESSES	109
CHARACTERISTICS OF THE CONTACT AREA	119
SELF-PLANARIZING FEATURES Figures 6A-6C	123

ELECTRONIC COMPONENTS	129
SEMICONDUCTOR PACKAGES	130
SACRIFICIAL ELEMENTS Figures 8A-8D	135
SACRIFICIAL MEMBERS AND PROBE EMBODIMENTS	137
ADDITIONAL PROBE EMBODIMENTS	141
CONTACT-FABRICATION ON A SACRIFICIAL SUBSTRATE Figures 11A-11F	147
CONTACT GANG TRANSFER	150
TEMPORARY/PERMANENT METHODOLOGY	158
CHIP-LEVEL MOUNTING PROCESS	163
WAFER-LEVEL MOUNTING RESILIENT CONTACT STRUCTURES Figures 14F-14G, 15, 15A	170
NO SHORTING LAYER REQUIRED	176
INTERPOSERS	181
ADDITIONAL INTERPOSER EMBODIMENTS	188
ADDITIONAL SEMICONDUCTOR PACKAGE EMBODIMENTS	204
"LOOP" EMBODIMENTS	209
THERMAL PATH EMBODIMENTS	214
ASSEMBLIES OF ELECTRONIC COMPONENTS	217

ASSEMBLIES INCLUDING ELECTRONIC DEVICES	236
CARRIER ASSEMBLIES	240
DUT TEST INTERFACE ARRANGEMENT Figure 39	255
VARIOUS ADDITIONAL EMBODIMENTS	257 257
STEM AFFIXED WITHOUT BONDING	259
MANUALLY SHAPING THE WIRE STEM	260
OVERCOMING STICTION AND PRE-CLEANING THE WIRE Figures 43A, 43B	263
ORIENTATION OF THE CONTACT STRUCTURES	264
FLEXURE MECHANISMS	266
REDUCING INDUCTANCE	2 6 7
Figures 46A-46F, 46G TAPERED WIRE STEM	270
Figure 47 REMOVING THE WIRE STEM	271
Figures 48A-48E EUTECTIC CONTACT TIP	272
Figures 49A-49C	
TOPOGRAPHICAL CONTACT TIPS	274
DEMI-COATING	275
CONTACTING A CENTRAL PORTION OF THE WIRE STEM	276
Figures 52A-52D MULTIPLE FREE-STANDING WIRE STEMS, SINGLE SEVERING STEP	278
Figures 52E-52F, 53A-53D FLAT TAB TIPS, AND METHODS OF MAKING INTERCONNECTIONS Figure 54	282
ADVANTAGES	284
CLAIMS	290
ABSTRACT	356